

US EPA ARCHIVE DOCUMENT

**PROPOSED
TOTAL MAXIMUM DAILY LOAD (TMDL)**

**For
Dissolved Oxygen and Nutrients
In
Cross Canal-North Tidal (WBID 1625)
And
Allen Creek Tidal (WBID 1604)**

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September 30, 2009



Acknowledgments

EPA would like to acknowledge that the contents of this report and the total maximum daily load (TMDL) contained herein were developed by the Florida Department of Environmental Protection (FDEP). Many of the text and figures may not read as though EPA is the primary author for this reason, but EPA is officially proposing the TMDL for dissolved oxygen and nutrients for Cross Canal-North and Allen Creek and soliciting comment. EPA is proposing this TMDL in order to meet consent decree requirements pursuant to the Consent Decree entered in the case of Florida Wildlife Federation, et al. v. Carol Browner, et al., Case No. 98-356-CIV-Stafford. EPA will accept comments on this proposed TMDL for 60 days in accordance with the public notice issued on September 30, 2009. Should EPA be unable to approve a TMDL established by FDEP for the 303(d) listed impairment addressed by this report, EPA will establish this TMDL in lieu of FDEP, after full review of public comments.

This TMDL analysis could not have been accomplished without significant contributions from staff in Pinellas County, the Florida Department of Environmental Protection's Southwest District Office, and the Watershed Evaluation and TMDL Section.

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Websites

Florida Department of Environmental Protection, Bureau of Watershed Restoration

Total Maximum Daily Load (TMDL) Program

<http://www.dep.state.fl.us/water/tmdl/index.htm>

Identification of Impaired Surface Waters Rule

<https://www.flrules.org/gateway/chapterhome.asp?chapter=62-303>

STORET Program

<http://www.dep.state.fl.us/water/storet/index.htm>

2006 305(b) Report

http://www.dep.state.fl.us/water/tmdl/docs/2006_Integrated_Report.pdf

Criteria for Surface Water Quality Classifications

<http://www.dep.state.fl.us/water/wqssp/classes.htm>

Basin Status Reports

http://www.dep.state.fl.us/water/tmdl/stat_rep.htm

Water Quality Assessment Reports

http://www.dep.state.fl.us/water/tmdl/stat_rep.htm

U.S. Environmental Protection Agency

Region 4: Total Maximum Daily Loads in Florida

<http://www.epa.gov/region4/water/tmdl/florida/>

National STORET Program

<http://www.epa.gov/storet/>

Chapter 1: INTRODUCTION

1.1 Purpose of Report

This report presents the Total Maximum Daily Load (TMDL) for low Dissolved Oxygen (DO) concentrations for Cross Canal - North (WBID 1625) and Allen Creek Tidal (1604), both located in the Tampa Bay Basin – Coastal Old Tampa Bay Planning Unit (**Figure 1.1**). These estuaries were verified impaired for low DO and Nutrients and is included on the Verified List of impaired waters for the Tampa Bay Basin that was adopted by Secretarial Order in June 3, 2008. The TMDL establishes the allowable loadings to the Cross Canal - North (WBID 1625) and Allen Creek-Tidal (WBID 1604) watersheds that would restore these waterbodies so that they meet their applicable water quality criteria for DO and Nutrients.

1.2 Identification of Waterbody

Cross Canal-North (Cross Bayou Canal) is Located in the City of Pinellas Park in central Pinellas County, Florida. The City of Largo is located east of the watershed and the City of St. Petersburg is located south of Pinellas Park. The Cross Canal-North watershed encompasses approximately 4,197 acres of land and is approximately 5 miles long. The waters of Cross Canal North flow from Cross Canal South in an easterly direction into Tampa Bay and can have flow from Tampa Bay to Cross Canal South. The predominant landuse is approximately 3,203 acres of urban & build-up. The climate in Pinellas County, specifically areas surrounding the Cross Canal - North watershed, is sub-tropical with annual rainfall averaging approximately 51.75 inches, (CLIMOD, 2008). The topography of the Cross Canal - North watershed reflects its location within the Southwestern Florida Flatwoods or Southwestern Coastal Plains ecoregion. Elevations range in the watershed from around 0 – 10 feet above sea level and 10 – 20 feet above sea level in the upland portion (FDEP, 2008). The predominant soil type is shelly sand and clay (FDEP, 2008).

The Allen Creek Watershed is a typical urban stream located in the central portion of the City of Clearwater, in Pinellas County. The drainage basin is located in the central part of Pinellas County and includes parts of the cities of Clearwater and Largo. There are approximately 4,733 acres of land, with 2,057 acres within unincorporated Pinellas County. The main channel flows to the east, into Old Tampa Bay and is a natural mouth to Tampa Bay. Allen Creek (~5.78 miles) flows primarily in an easterly direction (draining about 6.99 square miles) into Tampa Bay.

Additional information about the river's hydrology and geology are available in the Basin Status Report for the Tampa Bay Basin (Florida Department of Environmental Protection [Department], 2001).

To provide a smaller-scale geographic basis for assessing, reporting, and documenting water quality improvement projects, FDEP divides basin groups into smaller areas called planning units. Planning units help organize information and management strategies around prominent sub-basin characteristics and drainage features. To the extent possible, planning units were chosen to reflect sub-basins that had previously been defined by the SWFWMD.

For assessment purposes, the Department has divided the Coastal Old Tampa Bay Tributary Planning Unit into water assessment polygons with a unique **waterbody identification** (WBID) number for each watershed. Cross Canal - North is WBID 1625 (**Figure 1.2a**) and Allen Creek Marine Watershed is WBID 1604 (**Figure 1.2b**).

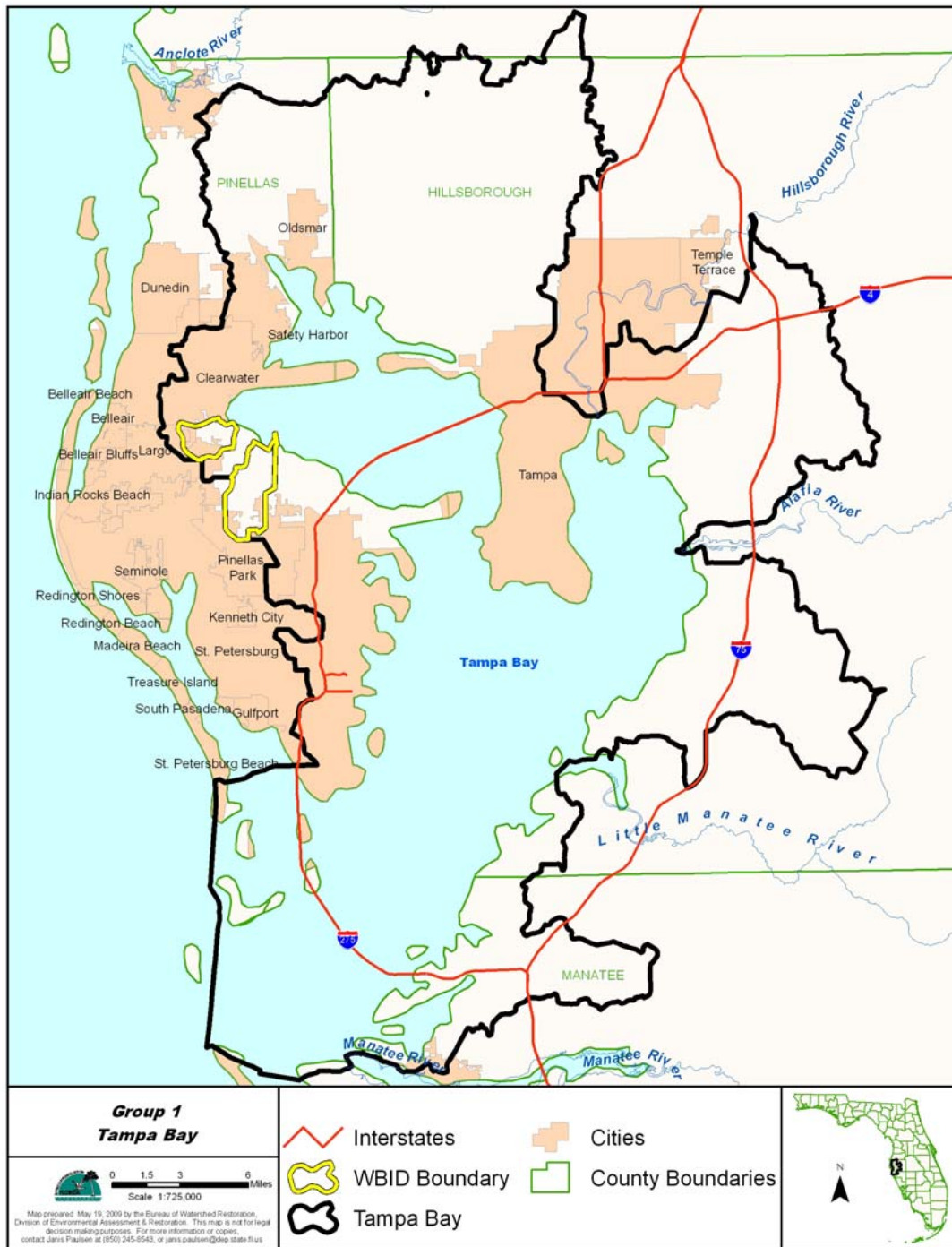


Figure 1.1 Location of Cross Canal - North (WBID 1625) and Allen Creek Tidal (WBID 1604) Watersheds with Major Geopolitical Features in the Coastal Old Tampa Bay

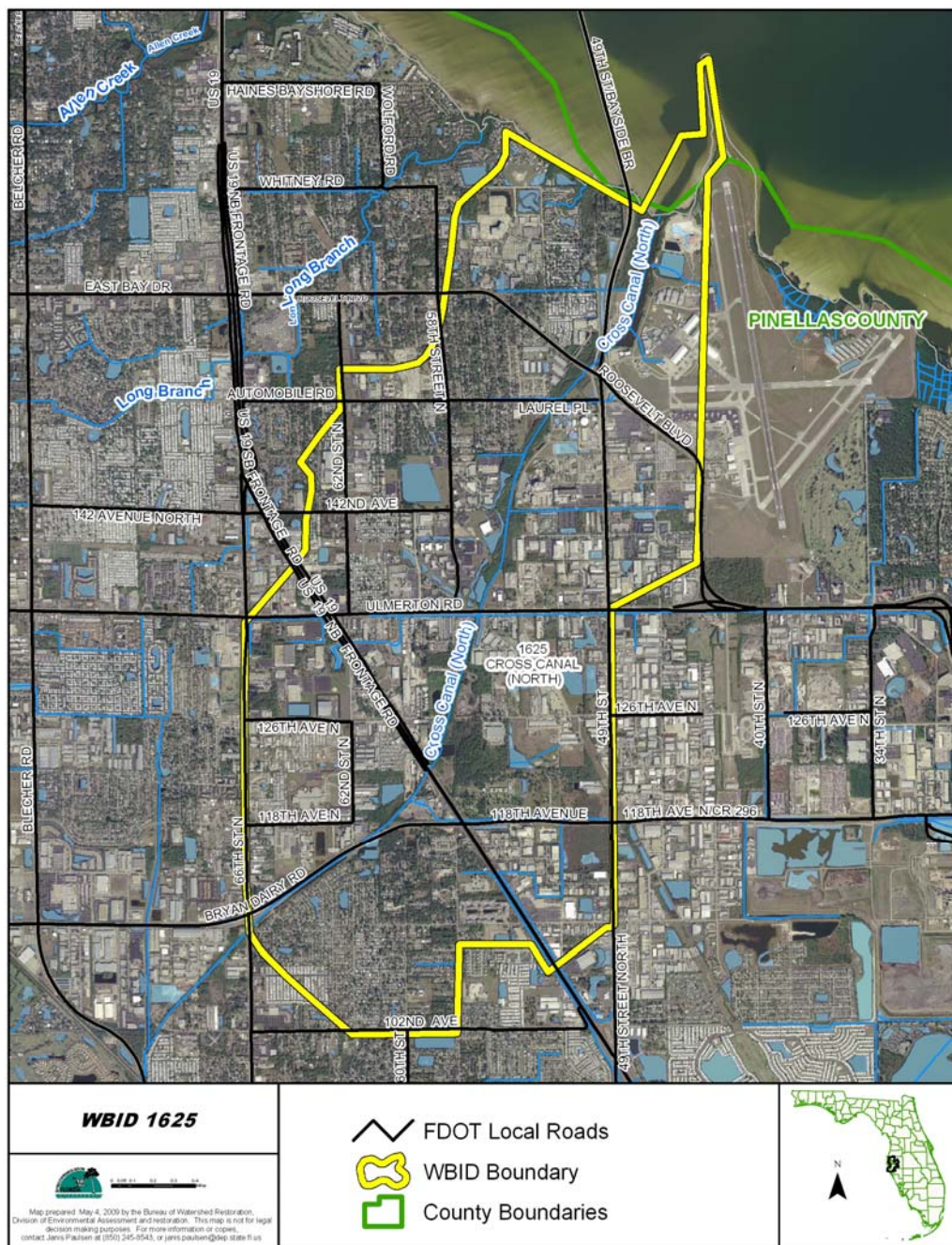


Figure 1.2a Location of Cross Canal - North (WBID 1625) Watershed in Coastal Old Tampa Bay

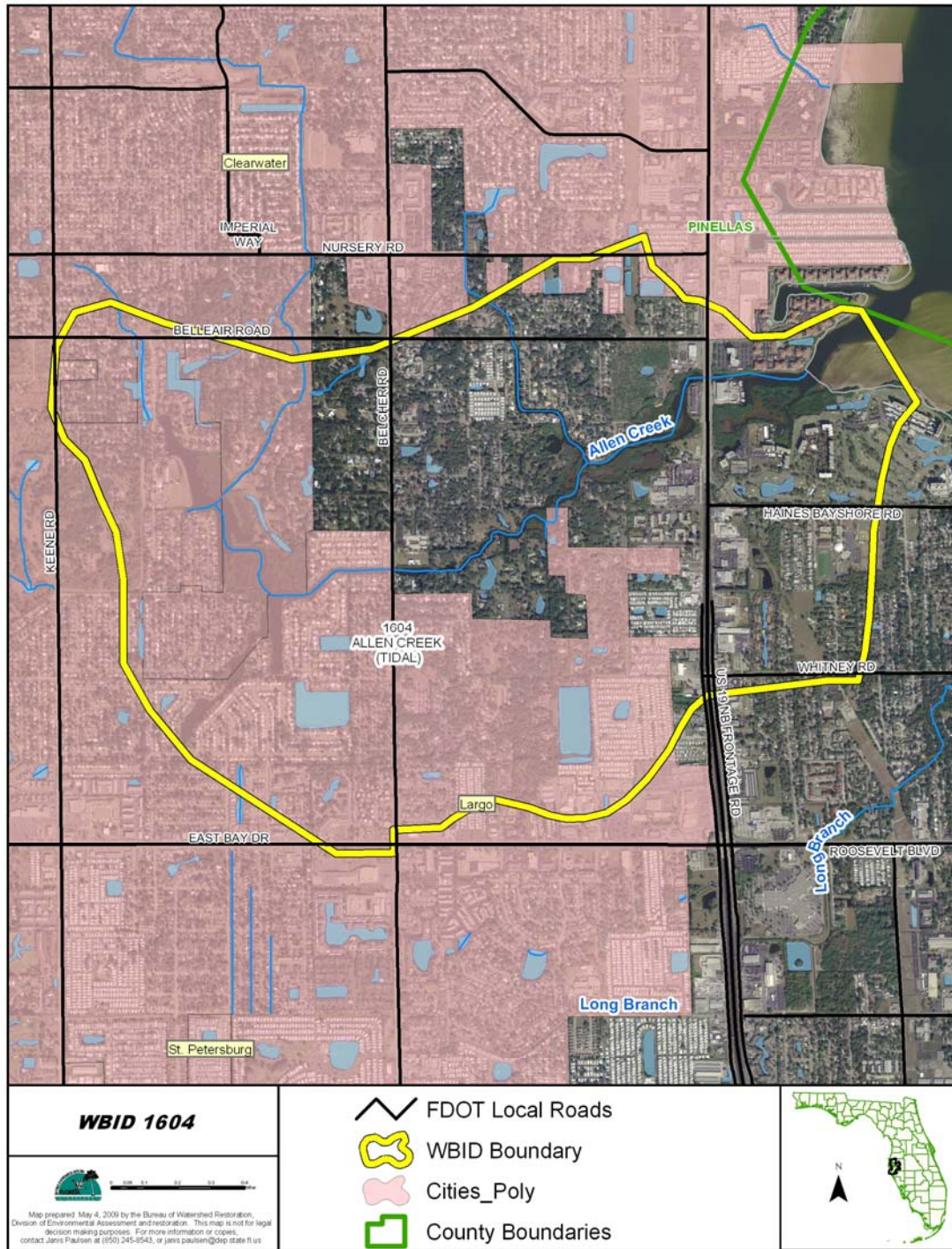


Figure 1.2b Location of Allen Creek Tidal (WBID 1604)

1.3 Background

This report was developed as part of the Florida Department of Environmental Protection's (Department) watershed management approach for restoring and protecting state waters and addressing TMDL Program requirements. The watershed approach, which is implemented using a cyclical management process that rotates through the state's fifty-two river basins over a five-year cycle, provides a framework for implementing the TMDL Program-related requirements of the 1972 federal Clean Water Act and the 1999 Florida Watershed Restoration Act (FWRA, Chapter 99-223, Laws of Florida).

A TMDL represents the maximum amount of a given pollutant that a waterbody can assimilate and still meet water quality standards, including its applicable water quality criteria and its designated uses. TMDLs are developed for waterbodies that are verified as not meeting their water quality standards. TMDLs provide important water quality restoration goals that will guide restoration activities.

This TMDL Report will be followed by the development and implementation of a Basin Management Action Plan, or BMAP, to reduce the amount of nutrients that caused the verified impairment of Cross Canal - North (WBID 1625) and Allen Creek (1604). These activities will depend heavily on the active participation of the Southwest Florida Water Management District, local governments, businesses, and other stakeholders. The Department will work with these organizations and individuals to undertake or continue reductions in the discharge of pollutants and achieve the established TMDLs for impaired waterbodies.

Chapter 2: DESCRIPTION OF WATER QUALITY PROBLEM

2.1 Statutory Requirements and Rulemaking History

Section 303(d) of the federal Clean Water Act requires states to submit to the U.S. Environmental Protection Agency (EPA) lists of surface waters that do not meet applicable water quality standards (impaired waters) and establish a TMDL for each pollutant causing impairment of listed waters on a schedule. The Department has developed such lists, commonly referred to as 303(d) lists, since 1992. The list of impaired waters in each basin, referred to as the Verified List, is also required by the FWRA (Subsection 403.067[4], Florida Statutes [F.S.]); the state's 303(d) list is amended annually to include basin updates.

Florida's 1998 303(d) list included several waterbodies in the Tampa Bay Basin. Cross Canal - North (WBID 1625) is 1998 303(d) listed. However, the FWRA (Section 403.067, F.S.) stated that all previous Florida 303(d) lists were for planning purposes only and directed the Department to develop, and adopt by rule, a new science-based methodology to identify impaired waters. After a long rulemaking process, the Environmental Regulation Commission adopted the new methodology as Rule 62-303, Florida Administrative Code (F.A.C.) (Identification of Impaired Surface Waters Rule, or IWR), in April 2001; the rule was modified in 2006 and 2007.

2.2 Information on Verified Impairment

The Department used the IWR to assess water quality impairments in the Cross Canal - North (WBID 1625) and Allen Creek (1604) watersheds and verified the impairments for Dissolved oxygen and Nutrients (**Table 2.1**). **Table 2.2** summarizes the data collected during the verification period (January 2000 – June 2007). The projected year for the development of the (1998 303(d) listed) Dissolved Oxygen TMDL for Cross Canal - North (WBID 1625) and Allen Creek (WBID 1604) was 2008, but the Settlement Agreement between EPA and Earthjustice, which drives the TMDL development schedule for waters on the 1998 303(d) list, allows an additional nine months to complete the TMDLs. As such, these TMDLs must be adopted and submitted to EPA by September 30, 2009.

These waterbodies were verified as impaired based on DO data. Using the IWR methodology, more than 10 percent of the values exceeded the Class III Marine criteria of 4 mg/L for Dissolved Oxygen, WBID (1625) with, 97 out of 182 and WBID (1604) 132 out of 403 samples. The Dissolved Oxygen data used in this report are confined in the IWR Run35 database. For Cross Canal North, the Chlorophyll-a annual average threshold of 11 ug/L for marine waters was exceeded in 2004 and 2005. The annual average Chlorophyll-a concentrations in ug/L during the verified period years of 2000 through 2007 was 6.43, 5.81, 6.85, 5.9, 21.26, 12.6, and 9.56, respectively.

The verified impairments were based on data collected by FDEP Southwest District and Pinellas County. WBID location and STORET stations are shown in **Figure 5.1**. **Figures 2.1a** and **2.1b** display the DO data collected during the verification period (January 2000 – June 2007) for Cross Canal – North and Allen Creek. The Figure reflects monthly composite values from the verified period.

Table 2.1 Verified Impairments for Cross Canal North (WBID 1625) and Allen Creek Tidal (WBID 1604)

WBID	Waterbody Segment Name	Parameters Included on the 1998 303(d) List	Parameter Causing Impairment	Projected Year for TMDL Development
1625	Cross Canal - North	Dissolved Oxygen	Total Nitrogen	2009
1625	Cross Canal - North	N/A	Nutrient (Chlorophyll-a)	2009
1604	Allen Creek Tidal	Dissolved Oxygen	Total Nitrogen	2009
1604	Allen Creek Tidal	Dissolved Oxygen	Nutrient (Chlorophyll-a)	2009

Table 2.2 Summary of Dissolved Oxygen Data Collected During Verification Period (January 2000 – June 2007) for Cross Canal - North (WBID 1625) and Dissolved Oxygen (WBID 1604)

Waterbody Segment Name	Total Number of Samples	IWR-required number of exceedances for the Verified List	Number of observed exceedances	Number of seasons data was collected	Mean	Median	Min	Max
Cross Canal – North (WBID 1625)	192	24	97	4	4.20	3.99	0.7	17.7
Allen Creek Tidal (WBID 1604)	403	49	132	4	5	4.75	0.36	15.9

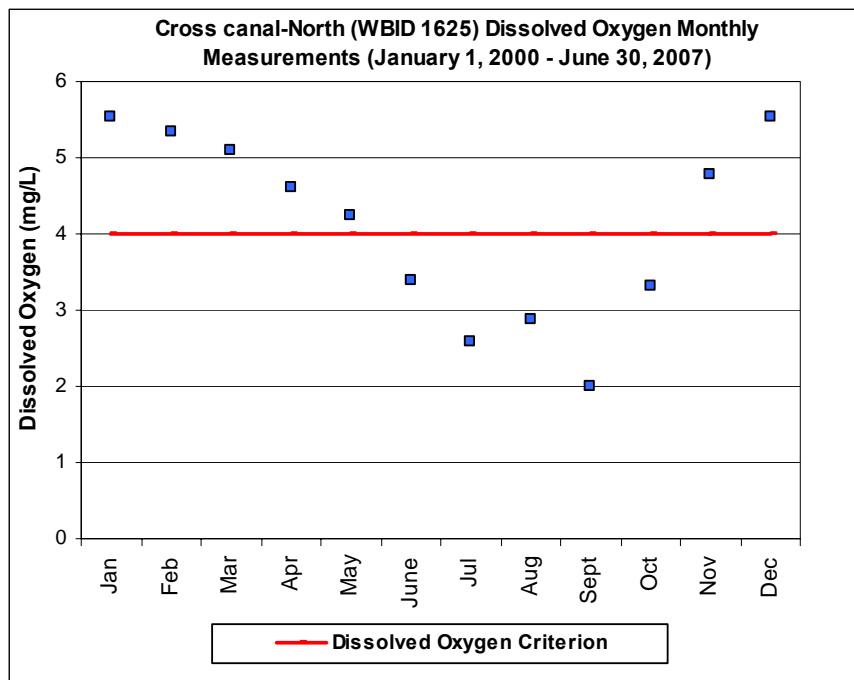


Figure 2.1a Dissolved Oxygen Measurements for Cross Canal - North (Verification Period: January 2000 – June 2007)

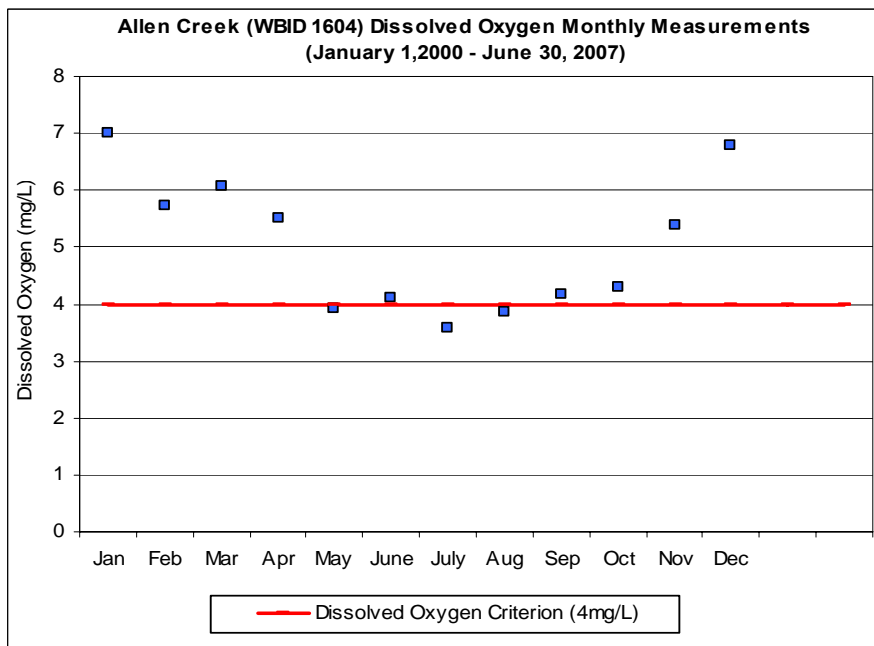


Figure 2.1b Dissolved Oxygen Measurements for Allen Creek (Verification Period: January 2000 – June 2007)

Chapter 3. DESCRIPTION OF APPLICABLE WATER QUALITY STANDARDS AND TARGETS

3.1 Classification of the Waterbody and Criteria Applicable to the TMDL

Florida's surface waters are protected for five designated use classifications, as follows:

- Class I** Potable water supplies
- Class II** Shellfish propagation or harvesting
- Class III** Recreation, propagation, and maintenance of a healthy, well balanced population of fish and wildlife
- Class IV** Agricultural water supplies
- Class V** Navigation, utility, and industrial use (there are no state waters currently in this class)

Cross Canal - North and Allen Creek are Class III waterbodies, with a designated use of recreation, propagation, and maintenance of a healthy, well-balanced population of fish and wildlife. The Class III water quality criteria applicable to the impairment addressed by this TMDL is Dissolved Oxygen and the narrative criteria for nutrients.

3.2 Applicable Water Quality Standards and Numeric Water Quality Target

3.2.1 Dissolved Oxygen Criteria

The Class III marine criteria for Dissolved Oxygen as established by Rule 62-302,530(30), F.A.C., states the following: Dissolved Oxygen shall not average less than 5.0 mg/L in a 24-hour period and shall not be less than 4 mg/L, and that normal daily and seasonal fluctuations above these levels shall be maintained.

Florida's nutrient criterion is narrative only, i.e. nutrient concentrations of a body of water shall not be altered so as to cause imbalance in natural populations of aquatic flora or fauna. Accordingly, a nutrient-related target was needed to represent levels at which an imbalance in flora or fauna is expected to occur. While the IWR provides a threshold for nutrient impairment for estuaries based on annual average chlorophyll a levels, these thresholds are not standards and need not be used as the nutrient-related water quality target for TMDLs. It should be recognized that the IWR thresholds were developed using statewide average conditions, the IWR (Section 62-303.450, F.A.C.) specifically allows the use of alternative site-specific thresholds that more accurately reflect conditions beyond which an imbalance in flora or fauna occurs in the waterbody.

3.2.2 Identification of Causative Pollutants

After verification of the low DO in the Cross Canal North and Allen Creek Tidal watersheds, the Department identified the causative pollutants by investigating those parameters typically responsible for depressed DO. These include nutrients (nitrogen and phosphorus) and BOD. One method of identifying causative pollutants is to use statewide screening level

concentrations set at the 70th percentile of all STORET data across the state from 1970 to 1987. This approach is useful if there are no significant regional differences in what is defined as a waterbody meeting its intended designated uses. The Department's statewide screening level for streams is 2.0 mg/L for BOD5, 1.6 mg/L for TN, and 0.22 mg/L for TP. But the Department has noted that there are significantly lower nutrient levels leading to impairment in South Florida than the statewide screening levels indicated. Other required considerations include the restrictions or nutrient targets of the receiving waters of the surface waters being analyzed. In the case of those waters in the Old Tampa Bay Planning area, there are Chlorophyll-A Targets that must be met. For Tampa Bay these targets are as stated in **Table 3.1** below;

Table 3.1 Tampa Bay Estuary Program Targets

Tampa Bay Segments	Tampa Bay Estuary Program Targets
Lower Tampa Bay	5.1 ug/L
Middle Tampa Bay	8.5 ug/L
Old Tampa Bay	9.3 ug/L
Hillsborough Bay	15 ug/L

The Chlorophyll-a target relevant to Cross Canal North and Allen Creek Tidal is that for Old Tampa Bay (9.3 ug/L). The Tampa Bay Estuary Program Old Tampa Bay Target is used to get the Total Nitrogen target for Cross Canal and Allen Creek Tidal. This estuary target must be that total nitrogen concentration consistent with a 9.3 ug/L estuary target. To determine this value, the Chlorophyll a concentrations of the bay WBIDs for verified period samples were matched to Total Nitrogen in those Bay WBIDs. The Total Nitrogen levels for periods when the chl-a concentration is 9.3 ug/L could thus be used to determine as the Target Total Nitrogen concentrations for Allen Creek Tidal and Cross Canal North Tidal. **Table 3.2** shows the Chla concentrations and the corresponding Total Nitrogen concentrations for Allen Creek (Tidal) and Cross Canal North (Tidal).

Table 3.2 Allen Creek and Cross Canal North TN and Chlorophyll-A

YEAR	Cross Canal North (1625)		Allen Creek-Tidal (1604)	
	Chl-a	TN	Chl-a	TN
2000	6.43	0.833	16.51	1.12
2001	5.81	1.11	17.59	1.12
2002	6.85	1.22	12.75	1.26
2003	5.9	1.34	6.81	0.95
2004	21.26	1.4	5.44	0.85
2005	12.6	1.02	8.66	0.93
2006	9.57	1.05	6.02	0.98

Figures 3.1a and **3.1b** are graph regression equations of the Chla-TN relationships for Cross Canal North and Allen Creek, respectively. The R² value of the TN-Chla relationship for Allen Creek is 0.59 and the R² for the TN-Chla relationship for North Cross Canal North is considerably lower (0.18), however the predicted TN is in the same general range.

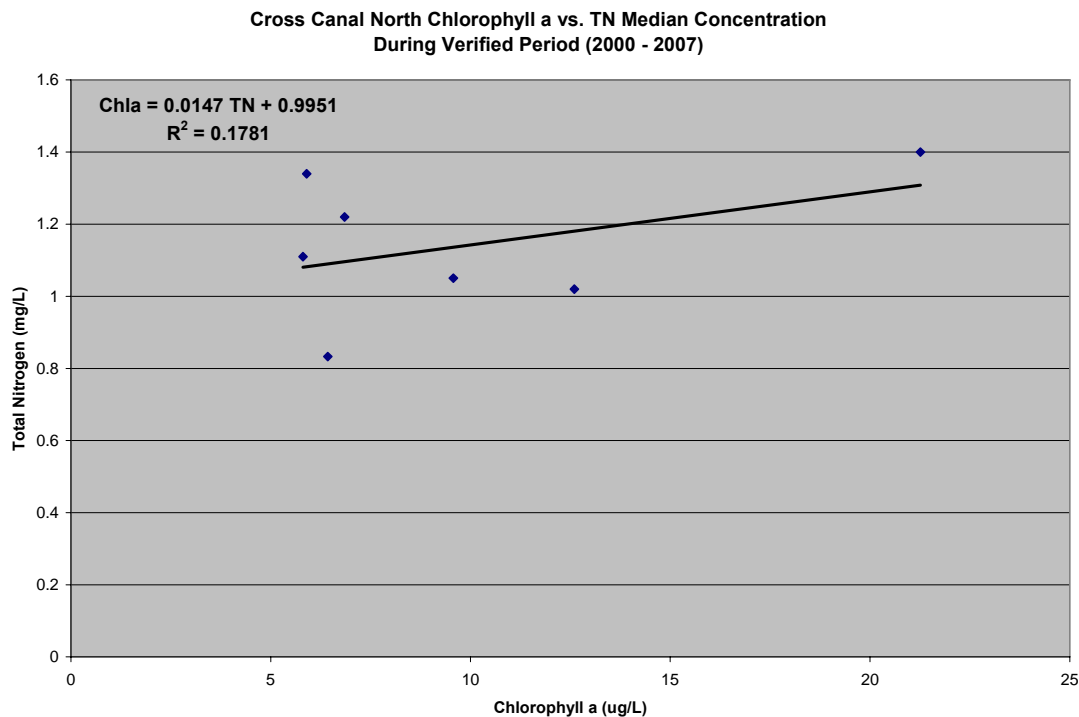


Figure 3.1a Chlorophyll a vs. TN, Cross Canal-North

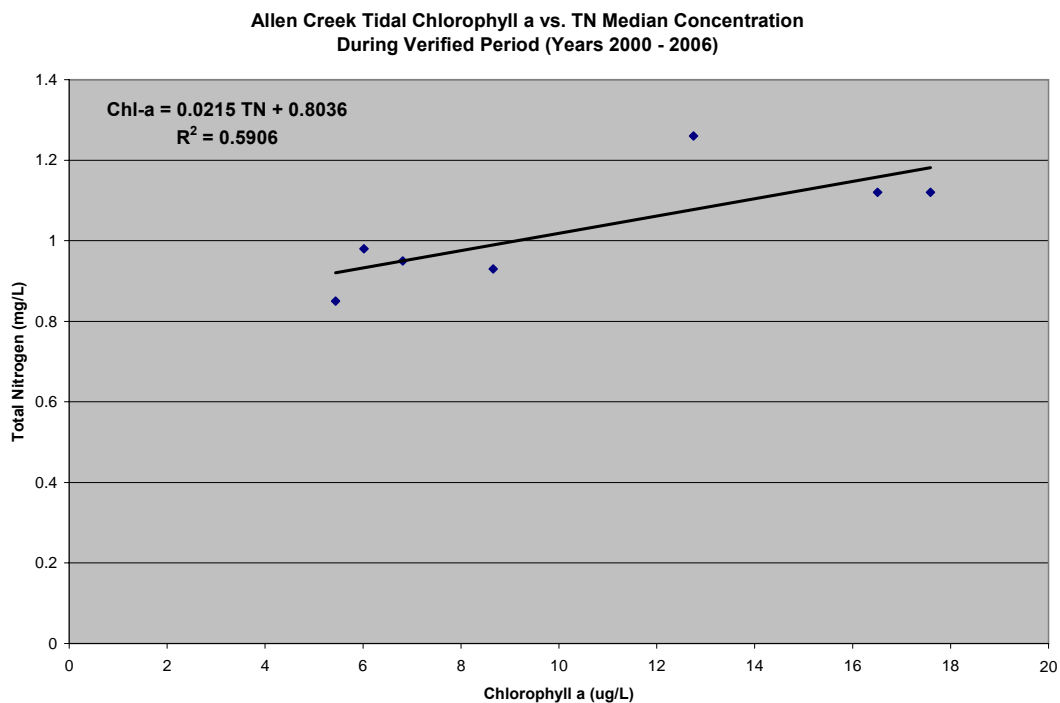


Figure 3.1b Chlorophyll-a vs. TN, Allen Creek

Solving the Cross Canal North regression equation for 9.3 ug/L (Old Tampa Bay Target) provides a TN equal to 1.13 mg/L. Solving the Allen Creek regression equation provides a TN =

1.00. With the stronger R2 for Allen Creek, and the proximity and similarity of these two estuaries, the conservative target of 1.0 from the Allen Creek regression equation can justifiably be applied to Cross Canal North, as well as Allen Creek. Although this assessment may demonstrate that a 1.0 mg/L concentration is protective of the Old Tampa Bay 9.3 ug/L Chla criteria, it does not demonstrate that it is protective of the DO Criteria of 4.0 mg/L. To determine a nutrient level protective of a dissolved oxygen concentration of not below 4 mg/L, with a mean of at least 5.0 mg/L, a reference approach was pursued. The concentrations of TN, DO, and Chlorophyll a were assessed for sample stations in WBIDs found not to be impaired for DO or nutrients and summarized in **Table 3.3**.

Table 3.3 Statistical Station Summaries of “Not Impaired” and “Impaired” Tampa Bay and Tampa Bay Tributary Sample Stations

Table 2		Sample Station Average Annual Median Concentration (Average = sum of yearly medians from table to left divided by # of years)				
Abbreviations: TB = Tampa Bay (Group 1) TBT = Tampa Bay Tribs (Group 2) NI = WBID NOT Impaired for DO or Nutr(chl-a) IM = WBID Impaired for DO & Nutr(chl-a)		Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	BOD - 5 Day (mg/L)	Chlorophyll-a (mg/L)	Dissolved Oxygen (mg/L)
Freshwater Streams (3F)	TB NI	0.97	0.202	1.63	2.53	7.53
	TBT NI	1.57	0.950	1.19	1.33	6.81
	TB IM	1.12	0.157	2.44	6.46	3.59
	TBT IM	1.53	0.512	1.85	15.91	4.58
Freshwater Lakes (3F)	TB NI	0.83	0.024	2.50	3.24	6.79
	TBT NI					
	TB IM	1.81	0.238		46.75	4.87
	TBT IM	2.59	0.344	6.33	136.85	10.57
Freshwater Class 1	TB NI					
	TBT Stream NI	0.90	0.308	1.99	4.96	6.81
	TBT Lake NI	0.93	0.263	2.31		7.10
	TB IM					
	TBT IM	1.06	0.248	2.59		5.51
Marine 3M	TB NI	0.62	0.181	1.50	7.58	6.11
	TBT NI	0.88	0.224	2.32		6.39
	TB IM	1.29	0.218	2.51	7.73	4.87
	TBT IM	0.97	0.243	1.32	8.41	4.80
Marine 2	TB NI	0.52	0.114	1.22	4.82	6.35
	TBT NI					
	TB either DO or Nutr. IM	0.61	0.107	1.58	6.80	6.53
	TBT IM					

Note: NI = Not Impaired for Dissolved Oxygen and not Impaired for Nutrients by FDEP IWR Assessment.

Table 3.3 shows that for “Not Impaired” WBIDs in Marine Estuary Tampa Bay WBIDs have an average median sample station TN concentration of 0.62 mg/L, the annual median Dissolved Oxygen concentration is 6.11 mg/L, and a mean Chlorophyll a concentration of 7.58 mg/L. In the nearby Tampa Bay Tributaries Group, the median sample station D.O. for ‘not impaired’ WBIDs is 0.88 mg/L, and although there were not enough Chlorophyll a samples to obtain a

median corresponding concentration, the DO median for these WBIDs is 6.39 mg/L, also well above the 4.0 mg/L Florida criteria. Thus, the TN target selected is the average of these two sets of 'Not Impaired' WBIDs me, or 0.75 mg/L. A target of 0.75 mg/L should be both protective of the Old Tampa Bay Chlorophyll-a limit, be protective of the dissolved oxygen criteria, and meet reasonable expectations of attainability when compared to standards of local WBIDs impaired neither for DO nor Nutrients. The present nutrient and BOD levels in Mullet Creek Tidal and Bishop Creek Tidal are shown in **Table 3.4**.

Table 3.4. Verified Period Summary of TN, TP, and B.O.D. Median Concentrations in Allen Creek Tidal and Cross Canal North Tidal

IWR Verified Period Summary (2000 - 2007)						
WBID	Total Nitrogen		Total Phosphorus		5 Day Bod	
	Sample Count	Concent. mg/L	Sample Count	Concent. Mg/L	Sample Count	Concent. mg/L
Cross Canal North, 1625	175	1.2	177	0.17	107	2
Allen Creek, 1604	373	0.98	386	0.21	215	2

Chapter 4: ASSESSMENT OF SOURCES

4.1 Types of Sources

An important part of the TMDL analysis is the identification of pollutant source categories, source subcategories, or individual sources of low DO in the watershed and the amount of pollutant loading contributed by each of these sources. Sources are broadly classified as either “point sources” or “nonpoint sources.” Historically, the term “point sources” has meant discharges to surface waters that typically have a continuous flow via a discernable, confined, and discrete conveyance, such as a pipe. Domestic and industrial wastewater treatment facilities (WWTFs) are examples of traditional point sources. In contrast, the term “nonpoint sources” was used to describe intermittent, rainfall-driven, diffuse sources of pollution associated with everyday human activities, including runoff from urban land uses, agriculture, silviculture, and mining; discharges from failing septic systems; and atmospheric deposition.

However, the 1987 amendments to the Clean Water Act redefined certain nonpoint sources of pollution as point sources subject to regulation under the EPA’s National Pollutant Discharge Elimination System (NPDES) Program. These nonpoint sources included certain urban stormwater discharges, including those from local government master drainage systems, construction sites over five acres, and a wide variety of industries (see **Appendix B** for background information on the federal and state stormwater programs).

To be consistent with Clean Water Act definitions, the term “point source” is used to describe traditional point sources (such as domestic and industrial wastewater discharges) and stormwater systems requiring an NPDES stormwater permit when allocating pollutant load reductions required by a TMDL. However, the methodologies used to estimate nonpoint source loads do not distinguish between NPDES stormwater discharges and non-NPDES stormwater discharges, and as such, this source assessment section does not make any distinction between the two types of stormwater.

4.2 Potential Sources of BOD and Low DO in the [Cross Canal-North or Allen Creek] Watershed

4.2.1 Point Sources

Estimating Point Source Loads

There are no permitted wastewater facilities located in Allen Creek. In Cross Canal North there is only one permitted facility, the City of Largo Advanced Wastewater Treatment Facility, FL0026603, which is a NPDES permitted domestic wastewater facility with a design capacity of 15 MGD. The treated effluent from the City of Largo AWWTF is discharged into Class III freshwaters of a lake on Feather Sound Golf Course. This lake outlet flows into a series of lakes then onto state-owned mangrove lands, through mosquito control ditch, Feather Sound (East of the Airport), and into Tampa Bay (**Figure 4.1**) Thus the treated effluent is discharged into Tampa bay, but not by way of Mullet Creek.

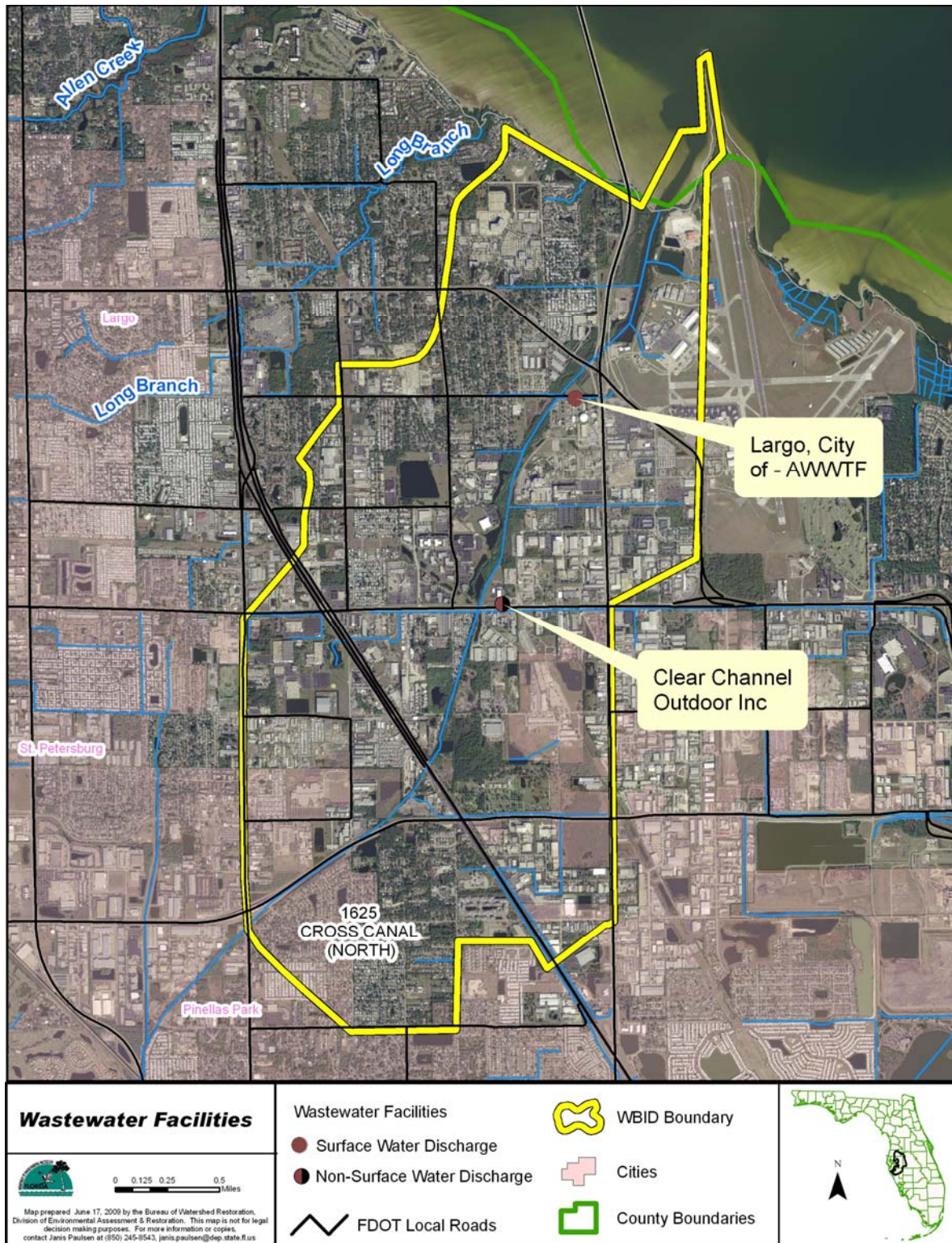


Figure 4.1 Wastewater treatment Facility in Cross Cross Canal North (WBID 1625).

Municipal Separate Storm Sewer System Permittees

Within the Cross Canal North, as well as Allen Creek, there is the same single Phase I municipal separate storm sewer system (MS4) permit (FLS000005, Pinellas County and co-permittees). The responsible co-permittees in Cross Canal North are 1 the City of Pinellas Park and Pinellas County. The responsible co-permittees in Allen Creek are the City of Largo, the City of Clearwater, and Pinellas County.

4.2.2 Land Uses and Nonpoint Sources

In the Cross Canal-North (4,721 acres) and Allen Creek (2,075 acre) watersheds, a number of land uses potentially affect water quality through nonpoint source runoff (**Figure 4.2**). The most significant nonpoint sources include runoff and erosion from developed areas, small-scale construction, residential and commercial fertilizer use, pets, residential septic tank failure, or poorly designed septic tanks. The watershed has a limited amount of agriculture, with 0.2% in Cross Canal North and 1.2% in Allen Creek.

Land Uses

Land use categories in the Cross Canal-North or Allen Creek watershed were aggregated using the simplified Level 1 codes (**Tables 4.1a** and **4.1b**). In Cross Canal North and Allen Creek, by far the largest Level 1 land use is urban and built-up (73.5 percent in Cross Canal North and 82% in Allen Creek). When looking at Level 2, which is a more detailed categorization of land use (**Tables 4.2a** and **4.2b**), urban and built-up land uses are comprised mainly of high density residential, medium density residential, low density residential and commercial. After urban and built-up, the second largest land use categories are water and wetland.

The runoff estimated from the [Cross Canal-North or Allen Creek] watershed is based on impervious area (Harper, 2003; Duncan, 1995), as shown in **Table 4.3a** and **4.3b**. The nutrient contributions are determined by combining the runoff information for each land use with the corresponding event mean concentration (EMC) (**Table 4.4a** and **4.4b**). These tables show that the top three land use potential contributors of TN are commercial, medium-density residential, and industrial, in order of decreasing contribution.

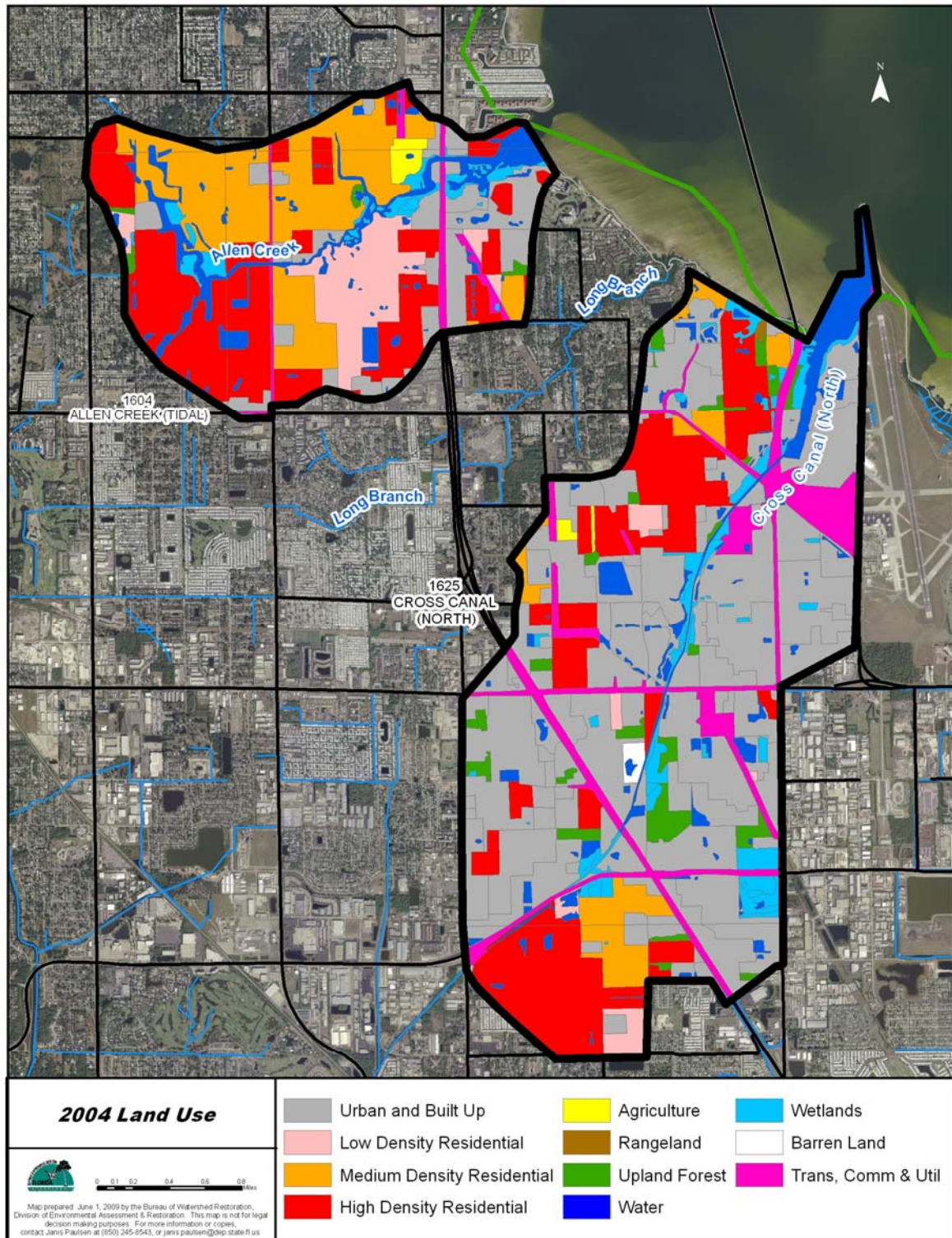


Figure 4.2 Cross Canal North (WBID 1625) and Allen Creek (WBID 1604) Land Use.

Table 4.1a. Level 1 Land Uses in the Cross Canal - North Watershed, WBID 1625

Landuse Code and Description (WBID 1625)	Acres	% Total
1000: Urban and Built up	3,471.9	73.5%
8000: Transportation, Communication, & Utilities	655.4	13.9%
5000: Water	248.8	5.3%
6000: Wetland	199.5	4.2%
4000: Upland Forests	118.6	2.5%
7000: Barren Land	12.8	0.3%
2000: Agriculture	10.2	0.2%
3000: Rangeland	3.7	0.1%
Total	4,720.9	100%

Table 4.1b. Level 1 Land Uses in the Allen Creek Watershed, WBID 1604

Landuse Code and Description (WBID 1604)	Acres	% Total
1000: Urban and Built up	1,700.2	81.9%
5000: Water	201.4	9.7%
6000: Wetland	70.9	3.4%
8000: Transportation, Communication, & Utilities	61.8	3.0%
2000: Agriculture	25.2	1.2%
4000: Upland Forests	15.7	0.8%
Total	2,075.1	100%

Table 4.2a. Classification of Level 2 Land Use Categories in the Cross Canal North (WBID 1625) Watershed.

Landuse Code and Description (WBID 1625)	Acres	% Total
1500: Industrial	1,217.6	25.8%
1300: Residential, High Density	716.2	15.2%
1400: Commercial	675.8	14.3%
8100: Transportation	554.2	11.7%
1700: Institutional	405.6	8.6%
1900: Openland	226.2	4.8%
1200: Residential, Medium Density	177.7	3.8%
5300: Reservoirs	136.1	2.9%
5400: Bays and Estruaries	111.7	2.4%
8300: Utilities	101.2	2.1%
6400: Vegetated Nonforested Wetlands	92.0	1.9%
4100: Upland Coniferous	83.7	1.8%
6100: Wetland hardwood forests	70.2	1.5%
4300: Upland Mixed Forest	34.9	0.7%
1100: Residential, Low Density	34.5	0.7%
6300: Wetland Forest Mixed	29.4	0.6%
1800: Recreation	18.4	0.4%
7400: Disturbed land	12.8	0.3%
2400: Nurseries and Vineyards	10.2	0.2%
6200: Wetland Coniferous Forests	5.1	0.1%
3200: Shrub and Brushland	3.7	0.1%
6500: Non Vegetated Wetlands	2.8	0.1%
5200: Lakes	1.0	0.0%
Total	4,720.9	100.0%

Table 4.2b. Classification of Level 2 Land Use Categories in the Allen Creek (WBID 1604) Watershed.

Landuse Code and Description (WBID 1604)	Acres	% Total
1300: Residential, High Density	628.7	30.3%
1200: Residential, Medium Density	555.9	26.8%
1100: Residential, Low Density	215.2	10.4%
1400: Commercial	135.9	6.6%
5400: Bays and Estuaries	134.8	6.5%
1700: Institutional	66.7	3.2%
5300: Reservoirs	63.7	3.1%
1800: Recreation	56.8	2.7%
8100: Transportation	41.9	2.0%
6100: Wetland hardwood forests	37.7	1.8%
1500: Industrial	29.8	1.4%
6400: Vegetated Nonforested Wetlands	27.9	1.3%
2200: Treecrops	20.6	1.0%
8300: Utilities	19.9	1.0%
4300: Upland Mixed Forest	15.7	0.8%
1900: Openland	11.1	0.5%
6300: Wetland Forest Mixed	4.9	0.2%
2600: Other Open Lands	4.5	0.2%
5200: Lakes	2.9	0.1%
6500: Non Vegetated Wetlands	0.3	0.0%
Total	2,075.1	100.0%

Table 4.3a. Allen Creek Land Use Categories and Runoff, 2000-07

Note: Based on effective rainfall of 55.95 inches per year. All impervious R.O. coefficients are 0.95.

Land Use	Area (acres)	Percent Impervious	Impervious Runoff Coeff.	Pervious Runoff Coeff.	Avg Precip. "/yr	Runoff (Acre-feet)	Runoff Million Gallons
A. Forest/Rural Open	83.52	27.0%	0.95	0.159	49.43	128.1	41.7
B. Urban Open	61.85	0.4%	0.95	0.041	49.43	11.5	3.8
C. Agriculture/Pasture	20.63	1.1%	0.95	0.317	49.43	27.5	9.0
D. Low Density/Residential	215.20	5.3%	0.95	0.150	49.43	170.9	55.7
E. Medium Density/Residential	555.88	24.8%	0.95	0.088	49.43	690.9	225.1
F. High Density/Residential	628.74	7.3%	0.95	0.120	49.43	468.5	152.6
G. Commercial	202.69	10.5%	0.95	0.120	49.43	173.3	56.5
H. Industrial	29.82	7.7%	0.95	0.120	49.43	22.6	7.4
I. Highways	0.00	2.6%	0.95	0.542	49.43	0.0	0.0
J. Wetland	70.86	9.4%	0.95	0.230	49.43	87.0	28.3
K. Water	201.37	3.8%	0.95	0.000	49.43	29.6	9.6
Other ²							0.0
Total	2070.56					1,809.73	589.7

Table 4.3b. Cross Canal North Land Use Categories and Runoff, 2000-07

Land Use	Area (acres)	Percent Impervious	Impervious Runoff Coeff.	Pervious Runoff Coeff.	Avg Precip. "/yr	Runoff (Acre-feet)	Runoff Million Gallons
A. Forest/Rural Open	363.21	27.0%	0.95	0.159	49.43	556.9	181.5
B. Urban Open	655.39	0.4%	0.95	0.041	49.43	122.4	39.9
C. Agriculture/Pasture	0.00	1.1%	0.95	0.317	49.43	0.0	0.0
D. Low Density/Residential	34.47	5.3%	0.95	0.150	49.43	27.4	8.9
E. Medium Density/Residential	177.68	24.8%	0.95	0.088	49.43	220.8	72.0
F. High Density/Residential	716.15	7.3%	0.95	0.120	49.43	533.6	173.9
G. Commercial	1081.44	10.5%	0.95	0.120	49.43	924.5	301.2
H. Industrial	1217.56	7.7%	0.95	0.120	49.43	921.8	300.4
I. Highways	0.00	2.6%	0.95	0.542	49.43	0.0	0.0
J. Wetland	199.51	9.4%	0.95	0.230	49.43	244.9	79.8
K. Water	248.79	3.8%	0.95	0.000	49.43	36.6	11.9
Other ²						0.0	0.0
Total	4694.20					3,588	1,169

Table 4.4a. Allen Creek Land Use Categories and Corresponding EMC Contributions Based on 2000-07 Rainfall

Land Use	TN Concentration (mg/L)	TP Concentration (mg/L)	TN load (lbs)	TP load (lbs)	Expressed as % of Total TN Watershed Load	Expressed as % of Total TP Watershed Load
A. Forest/Rural Open	1.09	0.046	379.6	16.0	3.7%	1.0%
B. Urban Open	1.12	0.18	35.2	5.7	0.3%	0.3%
C. Agricultural	2.32	0.344	173.8	25.8	1.7%	1.5%
D. Low density residential	1.64	0.191	762.0	88.7	7.5%	5.3%
E. Medium density residential	2.18	0.335	4,095.5	629.4	40.4%	37.5%
F. High density residential	2.42	0.49	3,082.9	624.2	30.4%	37.2%
G. Highways	2.42	0.49	1,140.3	230.9	11.2%	13.7%
H. Water	2.42	0.49	148.6	30.1	1.5%	1.8%
I. Rangeland	2.23	0.27	0.0	0.0	0.0%	0.0%
J. Wetland	1.01	0.09	238.9	21.3	2.4%	1.3%
K. Water	1.01	0.09	81.3	7.2	0.8%	0.4%
Total			10,137.9	1,679.2	100.0%	100.0%

Table 4.4b. Cross Canal North Land Use Categories and Corresponding EMC Contributions Based on 2000-07 Rainfall

Land Use	TN Concentration (mg/L)	TP Concentration (mg/L)	TN load (lbs)	TP load (lbs)	Expressed as % of Total TN Watershed Load	Expressed as % of Total TP Watershed Load
A. Forest/Rural Open	1.09	0.046	1,650.7	69.7	8.3%	1.94%
B. Urban Open	1.12	0.18	372.7	59.9	1.8%	1.67%
C. Agriculture/Pasture	2.32	0.344	0.0	0.0	0.0%	0.0%
D. Low Density/Residential	1.64	0.191	122.1	14.2	.61%	.39%
E. Medium Density/Residential	2.18	0.335	1,309.1	201.2	6.5%	5.6%
F. High Density/Residential	2.42	0.49	3,511.4	711.0	17.6%	19.8%
G. Commercial	2.42	0.49	6,083.9	1,231.9	30.5%	34.3%
H. Industrial	2.42	0.49	6,066.0	1,228.2	30.5%	34.2%
I. Highways	2.23	0.27	0.0	0.0	0.0%	0.0%
J. Wetland	1.01	0.09	672.5	59.9	3.3%	1.67%
K. Water	1.01	0.09	100.4	8.9	.50%	.25%
Total	0.00	0.00	19,888.8	3,584.9	100.0%	100.0%

Chapter 5: DETERMINATION OF ASSIMILATIVE CAPACITY

5.1 Determination of Loading Capacity

The goal of this TMDL analysis is to reduce the anthropogenic TN loads to conditions comparable to those found in surrounding, unimpaired watersheds. The methodology used is a percent reduction approach between the existing condition concentration and the region-based reference concentration.

5.2 Data Used in the Determination of the TMDL

Two stations located in the Cross Canal-North (WBID 1625) and Allen Creek (WBID 1604) have DO and TN observations. Data providers include the Department, Pinellas County, and SWFWMD, which maintains a routine sampling site. **Table 5.1a and 5.1b** show verified period sample analyses summaries for the major sample stations in the WBIDs. **Figure 5.1** shows the locations of the WBID's major ambient water sample sites.

The approach to calculating DO and nutrient TMDLs depends on the number of water quality samples and the availability of other required datasets. When minimal or no nutrient, BOD, or flow data are available, the existing loads are calculated using the nonpoint source spreadsheet and the TMDL is expressed as a percent reduction to meet a pollutant concentration target based on natural or reference conditions (EPA, 2000). The assumption is that BOD and nutrients (primarily TN and TP) are the major controllable factors for DO. To return DO concentrations to a "naturally" expected condition, unimpaired by pollutants, BOD and nutrient loadings also need to be returned to near natural loading conditions.

DO can also be affected or lowered by in-stream modifications such as dredging and channelization. These processes slow down water velocity, reduce reaeration, and increase the settling of solids, thus increasing sediment oxygen demand (SOD) and lowering DO concentrations. Further analyses and monitoring must be completed to develop an appropriate, site-specific DO criterion.

Table 5.1a Major Data Collectors and Station List for Cross Canal North

Station ID	Total Nitrogen Summary			D.O.			Chlorophyll a		
	Count	Median	75 Percentile	Count	Median	75 Percentile	Count	Median	75 Percentile
21FLPDEM24-02	39	1.01	1.23	38	4.815	5.77	28	5.35	8.5
21FLPDEM24-03	31	1.51	1.675	32	2.51	5.145	21	17.4	28.3
21FLPDEMAMB 24-2	30	1.055	1.185	34	4.345	5.42	15	6.5	11.95
21FLTPA 24040127	23	1.27	1.62	24	3.71	4.62			
21FLPDEMAMB 24-3	16	1.19	1.385	18	1.615	3.18	16	1.95	4.85
21FLTPA 24040108	8	1.87	2.3	8	2.93	5.555			
21FLTPA 27525598242544	8	1.706	1.8325	8	3.23	3.6225			
21FLTPA 27543968242063	6	1.725	2.325	6	4.45	5.255			
112WRD 02308861	1	1.72	1.72	10	5.05	7.075			

Note: Total number of samples includes data for all parameters assessed in verified period.

Table 5.1b Major Data Collectors and Station List for Allen Creek Tidal

Station ID	Total Nitrogen Summary			D.O.			Chlorophyll a		
	Count	Median	75 Percentile	Count	Median	75 Percentile	Count	Median	75 Percentile
21FLPDEM19-02	38	0.795	0.8975	41	4.46	6.37	30	11.8	15.375
21FLPDEM19-08	37	1.39	1.58	40	6.09	6.865	29	2	3.7
21FLPDEM19-09	37	0.72	0.87	40	6.135	6.8925	29	2.1	4.1
21FLPDEM19-10	36	0.845	1.01	40	4.605	5.575	29	2.5	4.4
21FLPDEMAMB 19-5	36	1.43	1.645	36	3.635	4.6675	34	5.35	8.775
21FLPDEMAMB 19-6	35	1.33	1.52	36	3.705	5.205	36	18.5	35.25
21FLPDEMAMB 19-4	33	1.11	1.43	36	4.515	6.095	32	19.95	32.8
21FLPDEMAMB 19-1	32	0.82	0.9175	36	4.99	5.8975	28	8.95	12.575
21FLPDEMAMB 19-3	32	1.125	1.3675	34	4.435	5.5275	18	4.1	6.45
21FLTPA 27554138244454	23	0.984	1.1675	27	3.8	5.59			
21FLPDEMAMB 19-2	15	0.88	1.0125	16	4.875	6.1225	16	15.55	25.2
21FLTPA 2756187824522	5	0.63	0.653	5	6.32	7.36			
21FLTPA 275672824545	5	0.777	0.97	6	5.34	6.8375			

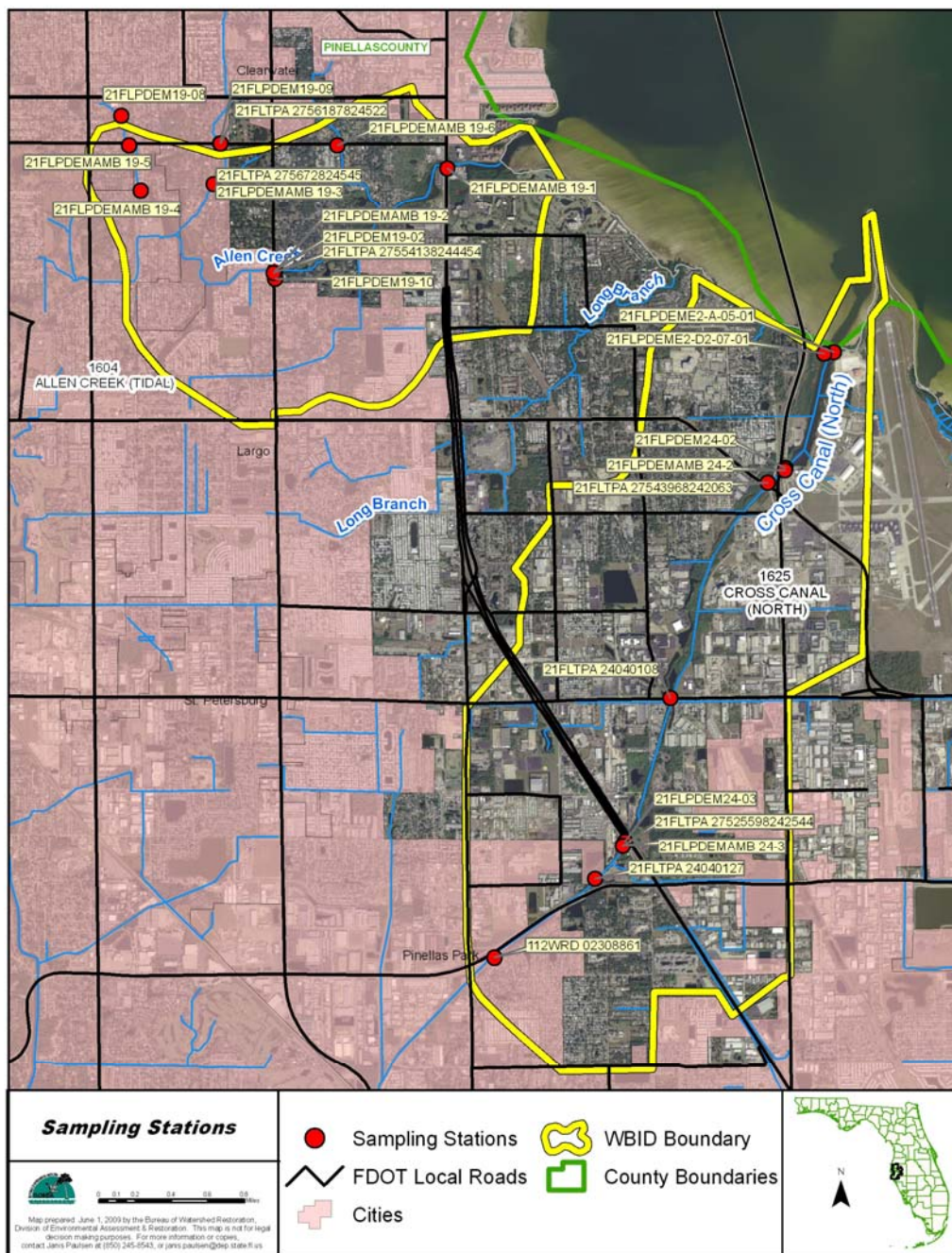


Figure 5.1. Cross Canal-North and Allen Creek Watershed, WBIDs 1625 and 1604, and Sample Stations

5.3 TMDL Development Process

Table 5.2a. Cross Canal North TN Percent Reduction Table, 2000-07

Major Sample Stations during verified period for CROSS CANAL (NORTH), WBID 1625	VP Sample Count	Sample Station Median Annual Total Nitrogen Concentration								Verified Period Maximum	
		2000	2001	2002	2003	2004	2005	2006	2007		
21FLPDEM24-02	39				1.16	1.13	1.20	0.89	0.70	1.20	
21FLPDEM24-03	31				1.51	1.66	1.61	1.20		1.66	
21FLPDEMAMB 24-2	30	0.80	1.03	1.10						1.10	
21FLTPA 24040127	23						1.27			1.27	
21FLPDEMAMB 24-3	16	0.87	1.19	1.34						1.34	
Worst Year Median TN to for which reduction is to be applied to (Maximum Annual Station median)										1.66	
										Target Concentration (mg/L)	0.75
										Percent Reduction	54.8%

Table 5.2b. Allen Creek TN Percent Reduction Table, 2000-07

Major Sample Stations during verified period for ALLEN CREEK (TIDAL), WBID 1604	VP Sample Count	Sample Station Median Annual Total Nitrogen Concentration								Verified Period Maximum Annual Median	
		2000	2001	2002	2003	2004	2005	2006	2007		
21FLPDEM19-02	38				0.83	0.84	0.78	0.78	0.62	0.84	
21FLPDEM19-08	37				1.30	1.16	1.30	1.52	1.42	1.52	
21FLPDEM19-09	37				0.71	0.62	0.68	0.80	0.87	0.87	
21FLPDEM19-10	36				0.95	0.80	0.90	0.81	0.79	0.95	
21FLPDEMAMB 19-5	36	1.47	1.21	1.55						1.55	
21FLPDEMAMB 19-6	35	1.31	1.37	1.29						1.37	
21FLPDEMAMB 19-4	33	0.91	1.09	1.47						1.47	
21FLPDEMAMB 19-1	32	0.72	0.84	0.85						0.85	
21FLPDEMAMB 19-3	32	1.20	1.10	1.13						1.20	
21FLTPA 27554138244454	23						0.98			0.98	
Worst Year Median TN to for which reduction is to be applied to (Maximum Annual Station median)										1.55	
										Target Concentration (mg/L)	0.75
										Percent Reduction	51.5%

The strategy for the goal in total nitrogen reduction is to have the maximum sample station median TN concentration observed during the verified period reduced to a level where it has been demonstrated to be at a median TN (and corresponding DO) which has been shown to meet Florida criteria. The reduction was thus calculated as follows;

$$\frac{[(\text{Max Observed TN}) - (\text{water quality target})]}{(\text{Max Observed TN})} \times 100$$

Where Max Observed TN = Maximum Verified Period Sample Station Median Annual TN Concentration

Tables 5.2a and **5.2b** shows this applied to Cross Canal North and Allen Creek. The resultant TN reduction is 54.8% for Cross Canal North and 51.5% for Allen Creek. From Table 3.3 it is clear that that the 0.75 mg/L target will result in dissolved oxygen median concentrations well above the FDEP DO criteria.

Chapter 6: DETERMINATION OF THE TMDL

6.1 Expression and Allocation of the TMDL

The objective of a TMDL is to provide a basis for allocating acceptable loads among all of the known pollutant sources in a watershed so that appropriate control measures can be implemented and water quality standards achieved. A TMDL is expressed as the sum of all point source loads (wasteload allocations, or WLAs), nonpoint source loads (load allocations, or LAs), and an appropriate margin of safety (MOS), which takes into account any uncertainty concerning the relationship between effluent limitations and water quality:

$$\text{TMDL} = \sum \text{WLAs} + \sum \text{LAs} + \text{MOS}$$

As discussed earlier, the WLA is broken out into separate subcategories for wastewater discharges and stormwater discharges regulated under the NPDES Program:

$$\text{TMDL} \cong \sum \text{WLAs}_{\text{wastewater}} + \sum \text{WLAs}_{\text{NPDES Stormwater}} + \sum \text{LAs} + \text{MOS}$$

It should be noted that the various components of the revised TMDL equation may not sum up to the value of the TMDL because (a) the WLA for NPDES stormwater is typically based on the percent reduction needed for nonpoint sources and is also accounted for within the LA, and (b) TMDL components can be expressed in different terms (for example, the WLA for stormwater is typically expressed as a percent reduction, and the WLA for wastewater is typically expressed as mass per day).

WLAs for stormwater discharges are typically expressed as “percent reduction” because it is very difficult to quantify the loads from MS4s (given the numerous discharge points) and to distinguish loads from MS4s from other nonpoint sources (given the nature of stormwater transport). The permitting of stormwater discharges also differs from the permitting of most wastewater point sources. Because stormwater discharges cannot be centrally collected, monitored, and treated, they are not subject to the same types of effluent limitations as wastewater facilities, and instead are required to meet a performance standard of providing treatment to the “maximum extent practical” through the implementation of best management practices (BMPs).

This approach is consistent with federal regulations (40 CFR § 130.2[I]), which state that TMDLs can be expressed in terms of mass per time (e.g., pounds per day), toxicity, or **other appropriate measure**. The TMDL for the Cross Canal-North (WBID 1625) and Allen Creek (WBID 1604) is expressed in terms of a percent reduction in TN to protect the DO concentration (**Table 6.1**).

Table 6.1. TMDL Components and Current Loadings for Cross Canal-North (WBID 1625) and Allen Creek (WBID 1604)

WBID	Parameter	TMDL (mg/L)	WLA		LA (% reduction)	MOS
			Wastewater (mg/L)	NPDES Stormwater (% reduction)		
1625	TN	0.75	N/A	54.8%	54.8%	Implicit
1604	TN	0.75	N/A	51.5%	51.5%	Implicit

N/A – Not applicable.

6.2 Wasteload Allocation

6.2.1 NPDES Wastewater Discharges

There are no permitted wastewater facilities located in Allen Creek. In Cross Canal North there is only one permitted facility, the City of Largo Advanced Wastewater Treatment Facility, FL0026603, which is a NPDES permitted domestic wastewater facility with a design capacity of 15 MGD. The City of Largo AWWTF effluent does not discharge into Cross Canal North, but into a series of small lakes and subsequently into Tampa Bay. Therefore no allocation for wastewater discharges is necessary.

6.2.2 NPDES Stormwater Discharges

Within the Cross Canal North, as well as Allen Creek, there is the same single Phase I municipal separate storm sewer system (MS4) permits (FLS000005, Pinellas County and co-permittees). The responsible co-permittees in Cross Canal North are the City of Pinellas Park and Pinellas County. The responsible co-permittees in Allen Creek are the City of Largo, the City of Clearwater, and Pinellas County.

6.3 Load Allocation

The LA is the nonpoint source component of the load, which, combined with WLA stormwater discharges, is responsible for 100 percent of the current load as well as the percentage load reduction. The TMDL is a 51.5 percent reduction of TN for Allen Creek and 54.8 percent TN reduction in Cross Canal North, all of which is allocated to the categories of LA and WLA stormwater.

6.4 Margin of Safety

Consistent with the recommendations of the Allocation Technical Advisory Committee (Department, 2001), an implicit MOS was used in the development of this TMDL. An implicit MOS was provided by the conservative decisions associated with a number of modeling assumptions, the development of site-specific alternative water quality targets, and the

development of assimilative capacity. An implicit MOS was used by targeting a loading based on not impaired waterbodies.

Chapter 7: NEXT STEPS: IMPLEMENTATION PLAN DEVELOPMENT AND BEYOND

7.1 Basin Management Action Plan

Following the adoption of this TMDL by rule, the next step in the TMDL process is to develop an implementation plan for the TMDL, referred to as the BMAP. This document will be developed over the next year in cooperation with local stakeholders, who will attempt to reach consensus on detailed allocations and on how load reductions will be accomplished. The BMAP will include, among other things:

- *Appropriate load reduction allocations among the affected parties;*
- *A description of the load reduction activities to be undertaken, including structural projects, nonstructural BMPs, and public education and outreach;*
- *A description of further research, data collection, or source identification needed to achieve the TMDL;*
- *Timetables for implementation;*
- *Confirmed and potential funding mechanisms;*
- *Any applicable signed agreement(s);*
- *Local ordinances defining actions to be taken or prohibited;*
- *Any applicable local water quality standards, permits, or load limitation agreements;*
- *Milestones for implementation and water quality improvement; and*
- *Implementation tracking, water quality monitoring, and follow-up measures.*

An assessment of progress toward the BMAP milestones will be conducted every five years, and revisions to the plan will be made as appropriate, in cooperation with basin stakeholders.

References

Duncan, H. 1995. *Urban stormwater pollutant concentrations and loads, Chapter 3*. Australian Runoff Quality Institution of Engineers, Australia's National Committee on Water Engineering.

Florida Administrative Code. *Rule 62-302, Surface water quality standards*.

———. *Rule 62-303, Identification of impaired surface waters*.

Florida Department of Environmental Protection. February 1, 2001. *A report to the Governor and the Legislature on the allocation of total maximum daily loads in Florida*. Tallahassee, Florida: Bureau of Watershed Management, Division of Water Resource Management.

Harper, H. 2003. *Evaluation of alternative stormwater regulations for southwest Florida: Draft final report* (Table 26: Summary of literature-based runoff concentrations for selected land use categories in southwest Florida). Water Enhancement & Restoration Coalition, Inc.

U.S. Environmental Protection Agency. 2000. *Ambient water quality criteria recommendations: Information supporting the development of state and tribal nutrient criteria for rivers and streams in Nutrient Ecoregion III*. EPA 822-B-00-016. Washington, D.C.

Appendices

Appendix A: Background Information on Federal and State Stormwater Programs

In 1982, Florida became the first state in the country to implement statewide regulations to address the issue of nonpoint source pollution by requiring new development and redevelopment to treat stormwater before it is discharged. The Stormwater Rule, as authorized in Chapter 403, F.S., was established as a technology-based program that relies on the implementation of BMPs that are designed to achieve a specific level of treatment (i.e., performance standards) as set forth in Rule 62-40, F.A.C.

The rule requires the state's water management districts to establish stormwater pollutant load reduction goals (PLRGs) and adopt them as part of a Surface Water Improvement and Management (SWIM) plan, other watershed plan, or rule. Stormwater PLRGs are a major component of the load allocation part of a TMDL. To date, stormwater PLRGs have been established for Tampa Bay, Lake Thonotosassa, the Winter Haven Chain of Lakes, the Everglades, Lake Okeechobee, and Lake Apopka. No PLRG had been developed for Newnans Lake at the time this analysis was conducted.

In 1987, the U.S. Congress established Section 402(p) as part of the federal Clean Water Act Reauthorization. This section of the law amended the scope of the federal NPDES stormwater permitting program to designate certain stormwater discharges as "point sources" of pollution. These stormwater discharges include certain discharges that are associated with industrial activities designated by specific standard industrial classification (SIC) codes, construction sites disturbing 5 or more acres of land, and master drainage systems of local governments with a population above 100,000, which are better known as MS4s. However, because the master drainage systems of most local governments in Florida are interconnected, the EPA has implemented Phase 1 of the MS4 permitting program on a countywide basis, which brings in all cities (incorporated areas), Chapter 298 urban water control districts, and Florida Department of Transportation (FDOT) throughout the 15 counties meeting the population criteria.

An important difference between the federal and state stormwater permitting programs is that the federal program covers both new and existing discharges, while the state program focuses on new discharges. Additionally, Phase 2 of the NPDES Program will expand the need for these permits to construction sites between 1 and 5 acres, and to local governments with as few as 10,000 people. The revised rules require that these additional activities obtain permits by 2003. While these urban stormwater discharges are now technically referred to as "point sources" for the purpose of regulation, they are still diffuse sources of pollution that cannot be easily collected and treated by a central treatment facility, as are other point sources of pollution, such as domestic and industrial wastewater discharges. The Department recently accepted delegation from the EPA for the stormwater part of the NPDES Program. It should be noted that most MS4 permits issued in Florida include a reopener clause that allows permit revisions to implement TMDLs once they are formally adopted by rule.